

On the morning of the 24th a disturbance had reached Manitoba with central pressure of 29.32 inches. In the early afternoon southwest warnings were issued for all upper Lakes station, except northwest at Duluth Minn., and at 4 p. m., for Lake Erie. At 10 p. m. the warnings were extended to Lake Ontario. In general these warnings were verified, but in most cases the wind did not become strong until the center of the depression had passed to the eastward, the winds being from the northwest.

On the morning of the 28th northeast warnings were issued for Lake Superior from Duluth to Munising. The warning was verified at Duluth. A similar warning was ordered for Duluth only on the night of the 29th, but this warning was lowered on the following morning when it had become apparent that the depression over the plains states was decreasing in strength.

Small-craft warnings were advised on the 4th for central and eastern Lake Superior and northern Lake Huron, and were issued by the Houghton official on the 11th and 21st and by the Ludington official on the 24th.

A special week-end forecast for Milwaukee and vicinity, prepared on Thursday mornings, was begun in October. This service is in response to the increasing demand that the regular forecasts be extended, especially to cover the week end, when the forecasts are a matter of much interest to those who take pleasure trips.

A second long-range forecast is also now being prepared for publication in the Wisconsin State Journal at Madison, Wis. This is made on Tuesdays and attempts to cover the conditions expected during the remainder of the week.

Special flying forecasts for zone 4 were sent to Selfridge Field in connection with the aviation meet held on October 13-15 and two special long-range forecasts, covering general weather conditions, were furnished the Detroit office.

The usual temperature forecasts for a week in advance and covering conditions in Montana and North Dakota were begun to the Wenatchee Valley Traffic Association on Monday, October 23. These forecasts were a feature of the work of this office during the last two winters, and are used by the association in connection with their fruit shipments to the East.—*Charles A. Donnel.*

NEW ORLEANS FORECAST DISTRICT.

Northeast storm warnings were displayed, 9 a. m., October 3, from Morgan City to Salmen, La., in connection with a disturbance in the middle Gulf. Small craft warnings were issued for the Texas coast, 9:30 a. m., October 17. Storm warnings were ordered for the Texas coast, Port Arthur to Velasco, and small-craft warnings for the remainder of the Texas coast, 9 a. m., October 23, 1922. Small-craft warnings were ordered, 9:20 a. m., October 25, for the Texas coast. Storm warnings were ordered 12:30 p. m., October 26, for stations at the mouth of the Mississippi River and small-craft warnings for the remainder of the Louisiana coast and the Texas coast, Port Arthur to Galveston. These warnings were generally justified by the subsequent conditions, notwithstanding storm winds did not occur at the stations named. No storm occurred without warnings.

Frost warnings were issued October 7 for the northern portion of Oklahoma and the Texas Panhandle; on the 8th, for northern Oklahoma; on the 10th, for northern Arkansas; on the 11th, for northern Oklahoma and northwestern Arkansas; on the 12th, for northern Arkansas;

on the 17th, for Arkansas, Oklahoma, the northern portion of west Texas, and the northwestern portion of east Texas; on the 18th, for Arkansas and Oklahoma; on the 23d, for Arkansas, Oklahoma, the northern portion of Texas, and northwestern Louisiana; on the 31st, for Oklahoma, west Texas, and the northwest portion of east Texas. These frost warnings were generally verified, and no frost of extent occurred without warnings.

"Norther" warnings were issued for Tampico, Mexico, October 17 and 23.

Fire-weather warnings were issued for Oklahoma, October 16.—*I. M. Cline.*

DENVER FORECAST DISTRICT.

Unusually dry weather, amounting to a drought in large areas, continued in the Denver forecast district during October, and the temperature for the month, as a whole, was considerably above the normal. Low temperatures, with frosts, occurred, however, on several dates. Timely warnings were issued, except for Modena, in extreme southwestern Utah.

The first freezing temperature warnings of the season for places in the fruit valleys in western Colorado were issued on the morning of the 6th. Temperatures as low as 27° were reported on the morning of the 7th in the Gunnison Valley. Warnings of heavy-to-killing frost were issued for Colorado and northern New Mexico on the 7th, with freezing temperature in localities in Colorado and possibly light frost in southeastern New Mexico. Heavy-to-killing frost was reported in northeastern Colorado and freezing temperature occurred in the greater part of the State.

On the 13th a trough of low barometer extended northeastward across Colorado to the Red River Valley of the North, and the barometer was rising in northwestern districts. A freezing-temperature warning for the fruit valleys of western Colorado was issued on the 13th and 14th, and was fully justified. An anticyclonic area from Alberta was moving rapidly southeastward over eastern Montana on the 16th, and the first warning of freezing temperature for eastern Colorado and northern New Mexico was issued on this date. Freezing temperature occurred as forecast, and killing frost, with freezing temperature, was reported on the eastern slope and as far south as Santa Fe. Freezing-temperature warnings were repeated for Colorado and northern New Mexico on the 17th to southeastern New Mexico, and frost was forecast for Utah. Freezing temperature or frost was reported, except in southeastern New Mexico, where a temperature of 36° occurred, with frost. Another trough of low barometer extended from New Mexico northeastward to Minnesota on the 21st, with a well-defined anticyclonic area in the north Pacific States. Freezing temperature or frost warnings were issued for Colorado and northern New Mexico on the 21st and 22d. The warnings were fully justified.

Warnings of freezing temperatures were issued for western Colorado, northwestern New Mexico, and Utah on the 28th. Freezing temperature occurred in localities in the region mentioned, with a temperature of 24° at Santa Fe and Albuquerque, and a killing frost was reported at the latter station. High pressure continued to spread slowly southeastward and the warnings were extended to northeastern Colorado and northern Arizona on the 29th and to southeastern New Mexico on the 30th, with possibly frost in south central Arizona. Temperatures of 20° to 24° occurred in the Gunnison Valley on

the morning of the 31st, 8° above zero was reported at Flagstaff, and the temperature fell below the freezing point at Roswell for the first time during the season, with a killing frost. The first heavy frost was reported at Salt Lake City, with a temperature of 34°. Warnings of freezing temperature were repeated on the 31st for southwestern Colorado and Utah, with possibly frost in south-central Arizona. Freezing temperatures occurred in these districts on November 1, and frost temperatures were reported at Phoenix on the mornings of October 31 and November 1.—*Frederick W. Brist.*

SAN FRANCISCO FORECAST DISTRICT.

During the greater portion of the period from the 1st to the 23d, high-pressure areas prevailed over the region between southeastern Alaska and the State of Washington. The Aleutian low-pressure area was pronounced during the entire month and on several occasions the barometer fell below 29 inches. None of the offshoots from this center of action succeeded in getting clear of the high-pressure barrier until late in the month, and then their energy was greatly diminished before crossing the Coast Range.

Storm warnings, however, were necessary at northern seaports on the 4th–5th, 24–25th, and 29th and along the California coast on the 9th and 26th. Although the wind at the stations where the storm warnings were displayed did not become very high, the gales were undoubtedly severe a short distance offshore.

Frost warnings were issued on several occasions for the States of Nevada, Idaho, and for the east portions of Washington and Oregon. These predictions were generally correct, and by the end of the month the growth of vegetation has ceased throughout this large area and no more warnings will be needed in that section until next spring.

Rain warnings were issued in California sufficiently in advance of every storm to enable those drying fruit in the open to stack their trays in time to prevent losses. The few losses that did occur through neglect or lack of help were an insignificant fraction of the crops involved as compared with the total output.—*E. A. Beals.*

RIVERS AND FLOODS

By H. C. FRANKENFIELD, Meteorologist.

There was no change in the prevailing low-water conditions, and there were no floods, except in the Santee River, where there were moderate floods from October 19 to 24, inclusive, from the heavy rains that fell on October 16 and 17. The swamps and adjacent lands have been flooded since the winter of 1921–22, and consequently there was no damage done.

Flood stages during October, 1922.

River and station.	Flood stage.	Above flood stages—dates.		Crest.	
		From—	To—	Stage.	Date.
ATLANTIC DRAINAGE.					
Santee:	<i>Feet.</i>			<i>Feet.</i>	
Rimini, S. C.	12	19	22	13.3	20
Ferguson, S. C.	12	20	24	12.7	23

MEAN LAKE LEVELS DURING OCTOBER, 1922.

By UNITED STATES LAKE SURVEY.

[Detroit, Mich., November 6, 1922.]

The following data are reported in the "Notice to Mariners" of the above date:

Data.	Lakes. ¹			
	Superior.	Michigan and Huron.	Erie.	Ontario.
Mean level during October, 1922:	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>
Above mean sea level at New York.....	602.50	579.97	571.96	245.61
Above or below—				
Mean stage of September, 1922.....	−0.19	−0.36	−0.47	−0.42
Mean stage October, 1921.....	−0.03	+0.11	+0.07	+0.50
Average stage for October, last 10 years.....	−0.22	−0.57	−0.33	−0.26
Highest recorded October stage.....	−1.06	−2.97	−1.84	−2.20
Lowest recorded October stage.....	+0.92	+0.37	+1.06	+1.94
Average relation of the October level to:				
September level.....		−0.20	−0.30	−0.30
November level.....		+0.20	+0.20	+0.20

¹ Lake St. Clair's level: In October, 571.69 feet.

INFLUENCE OF WEATHER ON CROPS AND FARMING OPERATIONS.

By J. WARREN SMITH, Meteorologist.

October, 1922, was mild for the season in all sections of the country, with scanty precipitation in most districts. Freezing weather extended during the week ending on the 24th as far south as southwestern Kansas, northwestern Arkansas, and southwestern Ohio, but no widespread damage occurred, as crops were mostly harvested or fully matured. Considerable local damage, however, occurred to grapes in the Chautauqua belt in New York during that week. The month was favorable as a rule for maturing late crops and for outdoor operations, and farm work made good advance, except where the soil was too dry for plowing and seeding. It was especially favorable for the harvest of corn in practically all sections, and at the close of the month cribbing was well under way, although it was rather too warm for storage in large quantities in some interior States, particularly in Iowa. Late corn made rather unsatisfactory growth in the central Gulf districts because of lack of rainfall.

At the beginning of the month there was a serious lack of moisture in much of the Great Plains and the Southwest which was unfavorable for seeding winter grains, and the drought was intensified during the first half of October by persistent absence of precipitation. Droughty conditions east of the Mississippi, however, were largely relieved in the Central and Eastern States by good rains about the 7th of the month. The increased moisture was very beneficial to early sown grains and facilitated seeding which had become backward. The latter half of the month was mostly favorable in the eastern grain States, but very little rain fell in the western Plains area, where wheat continued to suffer. The drought was broken in most of Texas and Oklahoma the latter part of the month, and at the same time rains and snows were beneficial in the central Rocky Mountain States.

Fair and moderately warm weather was the rule in the Cotton Belt and picking and ginning made unusually rapid progress. The weather was favorable for the development of late cotton in North Carolina, which turned out well; but, on the whole, conditions were unfavorable for top crop in nearly all sections of the belt and very little was produced. At the close of the month cotton was nearly all gathered in Tennessee and picking